Claims

Replace the corresponding claims in the original application with the following amended claims:

Claim 1. (original) A scalable light emitting diode (LED) with enhanced current spreading structures, comprising:

an LED core having:

an epitaxially grown p-type layer;

an epitaxially grown n-type layer; and

an epitaxially grown active layer between said p-type and n-type layers;

an first spreader layer adjacent to said LED core;

at least one groove through said LED core, to said first spreader layer;

a first contact having at least one first conductive finger on said first spreader layer within said at least one groove such that current flows from said first contact, into said at least one first conductive finger, into said first spreader layer, and into said LED core;

a second contact having at least one second conductive finger on said LED core opposite said first spreader layer such that current flows from said second contact into said at least one second finger and into said LED core.

Claim 2. (original) The LED of claim 1, wherein said first spreader layer is an n-type epitaxial layer.

Claim 3. (original) The LED of claim 1, wherein said n-type layer is adjacent to said first spreader layer.

Claim 4. (original) The LED of claim 1, wherein said second

contact and said at least one second conductive finger are on said p-type layer.

Claim 5. (original) The LED of claim 1, wherein said at least one second conductive finger and said at least one first conductive finger are generally parallel for a portion of their lengths.

Claim 6. (original) The LED of claim 1, wherein said at least one second conductive finger and said at least one first conductive finger are approximately uniform distance from one another for a portion of their lengths, to provide nearly uniform current injection into said LED core.

Claim 7. (original) The LED of claim 1, further comprising a substrate adjacent to said first spreader layer, opposite said LED core.

Claim 8. (original) The LED of claim 7, wherein said substrate is electrically conductive.

Claim 9. (currently amended) The LED of claim 1, further comprising a second spreader layer on said LED core opposite said first spreader layer, said second contact and said at least one second conductive finger disposed on said second spreader layer such that current applied to said second contact spreads to said at least one second conductive finger and throughout said second spreader layer, and into said LED core.

Claim 10. (original) The LED of claim 9, wherein said second spreader layer is a transparent conductor.

Claim 11. (currently amended) The LED of claim 9, ~~including one said first conductive finger~~, wherein said second contact and at least one second conductive finger form a generally U-shaped conductive path, said first contact and said first conductive finger forming an elongated conductive path within said U-shaped path.

Claim 12. (currently amended) The LED of claim 9, ~~including one said second conductive finger~~, wherein said first contact and at least one conductive finger form a generally U-shaped conductive path, said second contact and said at least one second conductive finger forming an elongated conductive path within said U-shaped path.

Claim 13. (currently amended) The LED of claim 9, ~~including~~ wherein said at least one first conductive finger and said at least one second conductive finger comprises a plurality of ~~said~~ first and second conductive fingers, respectively, said second contact near one edge of said LED and said first contact near the opposite edge, said second conductive fingers forming a plurality of conductive paths from said second contact toward said opposite edge, said first fingers forming a plurality of conductive paths from said first contact toward said second contact interdigitated between said second fingers.

Claim 14. (currently amended) The LED of claim 9, wherein said at least one first conductive finger and said at least one second conductive finger comprises a plurality of first and second conductive fingers, respectively, said second contact is located near the center of said current spreading layer and said second conductive fingers form conductive paths from said second contact toward the edge of said LED, and said first conductive fingers

form conductive paths from said first contact, toward said second contact interdigitated between said second conductive fingers.

Claim 15. (currently amended) The LED of claim 9, wherein said at least one first conductive finger and said at least one second conductive finger comprises a plurality of first and second conductive fingers, respectively, wherein said second contact is located in the center of said current spreading layer and further comprises two conductive branches forming conductive paths in opposite respective directions from said contact down a centerline of said LED, said second conductive fingers forming conductive paths generally orthogonal to said branches, said first conductive fingers forming conductive paths from said first contact and from the edge of said LED, toward said branches interdigitated between said second conductive fingers.

Claim 16. (currently amended) The LED of claim 9, wherein said at least one first conductive finger and said at least one second conductive finger comprises a plurality of first and second conductive fingers, respectively ~~including a plurality of said first and second conductive fingers~~, wherein said second fingers form generally parallel zig-zag conductive paths from said second contact, and said first fingers form generally parallel zig-zag conductive paths from said first contact interdigitated between said second zig-zag fingers.

Claim 17. (original) A scalable light emitting diode (LED) using flip-chip mounting and having enhanced current spreading structures, comprising:

an LED core having:

an epitaxially grown p-type layer;

an epitaxially grown n-type layer; and

an epitaxially grown active layer between said p-type and n-type layers;

an first spreader layer adjacent to said LED core;

at least one groove through said LED core, to said first spreader layer;

an first contact having at least one first conductive finger on said first spreader layer within said at least one groove such that current flows from said first contact, into said at least one first conductive finger, into said first spreader layer and into said LED core;

a second spreader layer adjacent to said LED core, opposite said first spreader;

a conductive layer having two separate sections, a first section of said conductive layer bonded to said second spreader;

a submount adjacent to said first section of said conductive layer, opposite said second spreader, the second section of said conductive layer also adjacent to said submount, said LED further comprising a conductive material between said second section and said contact, a bias applied to said first and second sections of conductive layer causing said LED core to emit light.

Claim 18. (original) The LED of claim 17, further comprising a substrate adjacent to said first spreader layer, opposite said LED core.

Claim 19. (original) The LED of claim 18, wherein said substrate is made of a transparent or semi-transparent and is the primary emitting surface for the light generated by said LED core.

Claim 20. (original) The LED of claim 17, wherein said second spreader layer is made of a semi-transparent material and further comprises a reflector to reflect light from the LED core toward

said substrate.

Claim 21. (original) The LED of claim 17, further comprising a bonding media between said conductive layer's first section and said second spreader, and wherein said conductive material comprising a bonding media.

Claim 22. (canceled) A semiconductor LED with current spreading structures, comprising:

two or more adjacent layers doped with impurities;

at least one groove etched through one or more of said layers, exposing a surface on or within one of said layers;

a first contact having at least one first conductive finger on said exposed surface within said at least one groove, such that current flows from said contact into said at least one first finger, and into said layer with said exposed surface; and

a second contact having at least one second conductive finger on the surface of said adjacent layers such that current flows from said second contact, into said at least one conductive second finger and into said adjacent layers.

Claim 23. (canceled) The semiconductor LED of claim 22, wherein said at least one second conductive finger and adjacent said at least one first conductive finger are generally parallel for a portion of their lengths.

Claim 24. (canceled) The semiconductor LED of claim 22, wherein said at least one second conductive finger and adjacent said at least one first conductive finger are approximately uniform distance from one another to provide nearly uniform current injection into said two or more adjacent layers doped with impurities.

Claim 25. (canceled) The semiconductor LED of claim 22, including one said first conductive finger, wherein said second contact and at least one conductive finger form a generally U-shaped conductive path, said first contact and said first conductive finger forming an elongated conductive path within said U-shaped path.

Claim 26. (canceled) The semiconductor LED of claim 22, including one said first conductive finger, wherein said first contact and at least one conductive finger form a generally U-shaped conductive path, said second contact and said second conductive finger forming an elongated conductive path within said U-shaped path.

Claim 27. (canceled) The semiconductor LED of claim 22, including a plurality of said first and second conductive fingers, said second contact near one edge of said adjacent layers and said first contact near the opposite edge, said second conductive fingers forming a plurality of conductive paths from said second contact toward said opposite edge, said first fingers forming a plurality of conductive paths from said first contact toward said second contact interdigitated between said second fingers.

Claim 28. (canceled) The semiconductor LED of claim 22, wherein said second contact is located near the center of the surface of said adjacent layers and said second conductive fingers form conductive paths from said second contact toward the edge of said surface of said adjacent layers, and said first conductive fingers form conductive paths from said first contact, toward said second contact interdigitated between said second conductive

fingers.

Claim 29. (canceled) The semiconductor LED of claim 22, wherein said second contact is located in the center of the surface of said adjacent layers and further comprises two conductive branches forming conductive paths in opposite respective directions from said contact down a centerline of said surface, said second conductive fingers forming conductive paths generally orthogonal to said branches, said first fingers forming conductive paths from said first contact and from the edge of said surface, toward said branches interdigitated between said second fingers.

Claim 30. (canceled) The semiconductor LED of claim 22, including a plurality of said first and second conductive fingers, wherein said second fingers form generally parallel zig-zag conductive paths from said second contact, and said first fingers form generally parallel zig-zag conductive paths from said first contact interdigitated between said second zig-zag fingers.

Claim 31. (canceled) A scalable light emitting diode (LED) with enhanced current spreading structures, comprising:

an epitaxially grown p-type layer;

an epitaxially grown n-type layer;

an epitaxially grown active layer between said p-type and n-type layers;

a first contact having at least one first conductive finger;

at least one groove etched through said p-type and active layers to said n-type layer such that said first contact and at least one finger fingers are on said n-type layer in the etched areas;

a second contact and at least one second conductive finger n

said p-type layer, wherein said at least one first and second conductive fingers are generally parallel for at least a portion of their lengths.